

DESTRUCTION OF WILD TOBACCO TREES
(*SOLANUM MAURITIANUM* SCOPOLI)
BY MOUNTAIN POSSUMS
(*TRICHOSURUS CANINUS* OGILBY)

S. VAN DYCK
Queensland Museum

ABSTRACT

The feeding activities of Mountain Possums (*Trichosurus caninus*), in the Conondale Range, southeastern Queensland, led to the defoliation and collapse of a stand (approximately 0.5 ha) of Wild Tobacco trees (*Solanum mauritianum*). It is unknown how the possums are protected from the highly toxic steroidal alkaloids present in the bark and leaves. It is proposed that the sudden absence of the Wild Tobacco trees will result in the area becoming overtaken by *Lantana camara*.

The Wild Tobacco tree (*Solanum mauritianum*), Plate 1, Fig. 1, is one of the most prominent pioneer shrubs in tropical and subtropical areas of northern New South Wales and Queensland. It grows rapidly into a small soft-wooded tree of up to six metres, and the large flannel-textured leaves and purple flowers make it a conspicuous feature of cleared rainforest patches and abandoned paddocks. Opinions differ as to whether the plant is native to Australia (Everist 1974, p. 470; Webb, Tracey and Williams 1972, p. 681). It is regarded as a noxious weed in many coastal rural areas because it invades rapidly, is difficult to eradicate once established, and seriously reduces pasture carrying capacities. However its ecological importance as a nursery shrub in disturbed forests is emphasized by Williams *et. al.* (1969, p. 531) who state that 'The building phase which follows [the pioneer phase] is primarily characterized by the persistence of two pioneer shrubs — *Omolanthus* and especially *Solanum mauritianum* — which together form what is in effect a preliminary canopy under which the shade tolerant plants of the mature forest can regenerate'.

The Mountain Possum (*Trichosurus caninus*) is common, but restricted to subtropical rainforests in Queensland and northern New South Wales, and wet sclerophyll and temperate forests throughout the rest of its range in eastern New South Wales and in Victoria. Owen and Thomson

(1965) report that these possums spend considerable time feeding on the ground and on understorey plants. They found its diet to consist mainly of herbaceous plants, fungi, leaves of shrubs and trees and occasionally lichens. In many areas of southeastern Queensland this possum has commonly been observed raiding council rubbish bins and household compost heaps. It is also regarded as a pest in many fruit orchards, particularly those containing bananas and pecan trees.

In the Conondale Range of southeastern Queensland where the observations reported here took place, the Mountain Possums restrict their activities to understorey trees and shrubs. The canopy feeders in this area are the Common Ringtail Possum (*Pseudocheirus peregrinus*), usually occurring in the rainforest, and the Greater Glider (*Schoinobates volans*) and Yellow-bellied Glider (*Petaurus australis*) which utilize the edge of the rainforest and emergent trees.

The destruction of the small, pure stand (approximately 0.5 ha) of Wild Tobacco trees mentioned here, occurred along the disturbed edges of logging roads and on an overgrown disused road in subtropical rainforest bordering Tragedy Creek (152° 35'E, 26° 42'S) in the Conondale Range of southeastern Queensland.

No more than three or four adults were seen feeding at any one time in the Tobacco Trees. This

contrasts with unnaturally high densities found in some suburban areas of outer Brisbane such as Mt Glorious, where as many as ten or twelve adults often congregate in single small trees, (eg. *Acacia* spp.) before descending to feed on compost scraps. Both males and females have been observed feeding on the Tobacco trees. The area was visited four times in eight months during 1977–8. The first observations were during the winter months. The Mountain Possums at this time fed on the bark, terminal branches and the leaves but appeared to prefer the bark, which was eaten to ground level and as far out on the branches as the animals' weights would permit them to reach (Pl. 1, Figs. 2 and 3). Their continued browsing over the next three months led to the eventual defoliation of shrubs over most of the area. Those shrubs (approximately 90% of the stand) that had been completely de-barked had dehydrated and had either been toppled over by wind or remained upright as dead sticks (Pl. 1, Figs. 4 and 5). In one small area some partially eaten trees had begun to sprout new shoots from the main trunk. Subsequent visits during the following summer, revealed Mountain Possums eating the leaves of such trees that had regrown (Pl. 1, Fig. 6).

DISCUSSION

Australian *Solanum* plants contain steroidal alkaloids in the form of solasodine. Collins, Eastwood and Swan (1976) comment that three species (*Solanum aviculare*, *S. laciniatum* and *S. similie*) contain high enough concentrations of solasodine to be considered suitable for possible cultivation as part of an Australian steroid industry. Solasodine has a very similar structure to diosgenin, a plant steroid extracted from the yam *Dioscorea*, grown extensively in Mexico. This steroid is chemically converted into sex steroids used in oral contraceptives throughout the world. Solasodine can similarly be converted into marketable sex steroids.

An assay of the steroidal alkaloids found in *Solanum mauritianum* (J. M. Swan pers. comm.), revealed 0.18, 0.09 and 1.11% of solasodine in the dried leaf, stem (bark and core of terminal branches) and green fruits respectively. These figures refer to the aglycone obtained after acid hydrolysis, the alkaloid actually occurring as the glycosides, solasonine and solamargine. Solasodine glycosides are very toxic. Everist (1964) reports a few cases of fatal poisoning in pigs and cattle in Queensland. As part of a demonstration of the toxic effects of these glycosides, A. A. Seawright (pers. comm.) fed a 5–10 ml homogenate of

ground green berries of *S. mauritianum* to guinea pigs and the animals died within an hour after ingestion. Everist (1974, p. 471), reporting similar demonstrations by Seawright, noted that the 'Symptoms and post mortem appearance were those of acute gastrointestinal irritation'. He also notes a case of fatal human poisoning that followed ingestion of the fruits of this plant.

The berries of the Wild Tobacco are commonly eaten by rainforest birds such as King Parrots (*Alisterus scapularis*), Brown Pigeons (*Macropygia amboinensis*) and Satin Bowerbirds (*Ptilinorhynchus violaceus*), but there are few reports of native mammals eating these fruits. J. Winter (pers. comm.) has observed Spectacled Fruit Bats (*Pteropus conspicillatus*) squeezing and consuming the juice but discarding the fibre and seeds of the berries. J. A. Lamberton (pers. comm.) points out that in another species, *S. aviculare*, the concentration of solasonine is highly variable, the greatest concentrations being formed in under-ripe fruit. The alkaloid disappears rapidly as the fruit ripens.

The leaves of the Wild Tobacco tree are sometimes eaten by native mammals. In his discussion of the Coppery Brushtail (*Trichosurus vulpecula*) Russell (1977) states that 'They also eat the leaves of the Wild Tobacco bush, almost defoliating a particular bush at times. Again this is the only possum I have seen eating this plant.' J. Winter (pers. comm.) also reports individuals of *T. vulpecula* eating these leaves in areas of the Herberton Range of northeastern Queensland. M. Archer (pers. comm.) reports Mountain Possums eating leaves from the same species on Mt Glorious, 30 km west of Brisbane.

This is the first report of a mammal or bird eating the bark of the Wild Tobacco tree.

It is surprising that possums should find the tree edible. No tests have been made to determine the manner in which Mountain Possums are protected from the potentially toxic effects of this food but it is possible that some protection is afforded by the action of microsomal enzymes (see Freeland and Winter (1975) on feeding in *T. vulpecula*).

It is not yet known if this tree is a preferred food of the Mountain Possum or something eaten only when no other more appetizing foods are available. In 1977, when the observations were made the area was suffering a drought. The destruction of the patch of Wild Tobacco trees would no doubt affect patterns of succession in that area. Immediately adjacent to the study area were well established patches of *Lantana camara*. Williams *et al.* (1969, p. 531) point out that as soon as the 'preliminary canopy' dies and the

canopy opens then succession follows one of two paths depending on whether ' . . . more advanced plants than *Solanum mauritianum* are already forming a canopy which will occur only on litter-intact sites. On such sites such shade tolerant species of e.g. *Urtica*, *Sambucus* and *Laportea* are to be expected, since they are able to outgrow *Lantana* and prevent its establishment; but in the bare and well lighted sites . . . where the advanced species are not yet established, disappearance of the preliminary canopy will favour the growth of *Lantana* even more strongly'.

The lack of more advanced plants than *Solanum mauritianum* in the study area suggests that the area will eventually become overtaken by *Lantana*.

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LITERATURE CITED

- COLLINS, D. J., EASTWOOD, F. W., SWAN, J. M. and FRYER, C., 1976. A steroid industry in Australia? *Search* **7**(9): 378-83.
- EVERIST, S. L., 1974. 'Poisonous Plants of Australia'. (Angus and Robertson: Sydney.)
- FREELAND, W. J. and WINTER, J. W., 1975. Evolutionary consequences of eating: *Trichosurus vulpecula* (Marsupialia) and the genus *Eucalyptus*. *J. Chem. Ecol.* **1**(4): 439-55.
- OWEN, W. H. and THOMSON, J. A., 1965. Notes on the comparative ecology of the Common Brushtail and Mountain Possums in eastern Australia. *Vict. Nat.* **82**: 216-7.
- RUSSELL, R., 1977. 'The Coppery brushtail'. *The North Queensland Register* May 14 1977, p. 5.
- WILLIAMS, W. T., LANCE, G. N., WEBB, L. J., TRACEY, J. G. and DALE, M. B., 1969. Studies in the numerical analysis of complex rain-forest communities. *J. Ecol.* **57**: 515-35.
- WEBB, L. J., TRACEY, J. G. and WILLIAMS, W. T., 1972. Regeneration and pattern in the subtropical rainforest. *J. Ecol.* **60**: 675-95.

PLATE 1

- FIG. 1: Uneaten Wild Tobacco tree (*Solanum mauritianum*).
FIG. 2: Bark eaten from main stem.
FIG. 3: Partially eaten Wild Tobacco trees.
FIG. 4: Stake left after debarked limb had dehydrated and collapsed.
FIG. 5: Defoliated Wild Tobacco trees.
FIG. 6: Mountain Possum (*Trichosurus caninus*) eating leaves of Wild Tobacco tree.



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